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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,124	08/18/2006	Isao Sakamoto	P30245	1323

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EXAMINER	
TAKEUCHI, YOSHITOSHI	

ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
12/21/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com
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Office Action Summary	Application No.	Applicant(s)	
	10/598,124	SAKAMOTO ET AL.	
	Examiner	Art Unit	
	YOSHITOSHI TAKEUCHI	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-13 and 15-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-13 and 15-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1, 3-13 and 15-18 are presented for examination, wherein claim 13 is presently amended and claims 17-18 are newly added. Claims 2 and 14 are cancelled.

2. The 35 U.S.C. § 103(a) rejections of claims 1, 3-13 and 15-16 are withdrawn as a result of the applicant's arguments and amendments to the claims.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

COMPOSITION

4. Claims 1-2 and 3-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (WO 03/026835 A1, with specific references made through Saito et al. (US 2004/0250919) in view of an English abstract of Nakajima et al (JP-05-000391).

a. Regarding claim **1**, Saito teaches a solder flux composition (abstract) for use in electronic components (paragraph 0002) and a method of soldering using the same, wherein the liquid substance contains a flux component (abstract) and a tin alloy (paragraph 0111, where the solder powder may be of any kind, including Sn/Pb, Sn/Ag, Sn/Ag/Cu, Sn/Cu, Sn/Zn, Sn/Zn/Bi, Sn/Bi, or Sn/In, which is similar to the solder powder composition described in the Specification, p.9, line 10), where the flux reaction temperature is close to the melting point of the solder particle (Table 1, where the flux reaction temperatures is 100°C and 120°C. The soldering temperature of some $SnIn_{52}$ soldering alloys is known to be 118°C and the melting temperature of some $SnBi_{58}$ soldering alloys is known to be 138°C); the flux component reacts at a melting point of

the solder particles (Table 1, where the flux reaction temperatures is 100° C to 120° C. The soldering temperature of some $SnIn_{52}$ soldering alloys is known to be 118° C); the mixture of the liquid substance and solder particles has a viscosity that flows at room temperature (Paragraph 0117, where Saito teaches a solder paste which can be applied by "flowing or dipping," paragraph 0118, where the method of soldering may be "performed by an ordinary method under ordinary conditions, and Table 1, synthesis example 3 and paragraph 0122, where one embodiment expressly taught has a viscosity of 0.1 poise at 25°C); the solder particles are mixed in the liquid substance at room temperature (paragraph 0113, where mixing may be performed at any temperature, but preferably at 5 to 25°C); the mixture of liquid substances and solder particles having viscosity that flows at a normal temperature and that deposits in layers on a base material (abstract); and the solder particles are granular agents (paragraph 0018) that precipitate in the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), having a mixing ratio and a particle diameter to be uniformly dispersible within the liquid substance (paragraph 0117, inherent characteristic of a tin solder powder, since a non-uniform dispersion would cause unacceptable amounts of failures in the electronic components due to non-uniform bump beads). However, Saito does not expressly teach a mixing ratio of the solder particles is less than or equal to 30wt%.

Nakajima teaches a solder paste composition, wherein the solder composition contains less than or equal to 45 wt% solder powder, which overlaps the instantly

claimed 30 wt% or less solder powder, in order to obtain the required tackiness and viscosity. (English abstract).

As a result, it would have been obvious to a person of ordinary skill at the time of the invention to prepare the solder composition of Saito with 30 wt% or less solder powder, as taught by Nakajima, in order to obtain the required tackiness and viscosity. (Nakajima, English abstract).

Saito teaches mixing the flux component (paragraph 0109), therefore a "uniform mixture" would be a degree of mixing and therefore obvious. See MPEP § 21144.05(II).

b. Regarding claim **3**, Saito in view of Nakajima teaches the composition of claim 1, wherein Saito teaches the solder particle diameter less than or equal to 35um. (Paragraph 0111, teaching spherical particles with 20 micron diameters).

c. Regarding claim **4**, Saito in view of Nakajima teaches the composition of claim 1, wherein Saito contemplates the solder particle with an oxide film is created without additional treatment, since Saito provides for an optional antioxidant. (Paragraph 0115).

d. Regarding claim **5**, **6**, and **7**, Saito in view of Nakajima teaches the composition of claim 1, wherein Saito teaches the use of a liquid flux composed of fatty acid, of which at least some would be "free fatty acids" since they are not attached to other molecules. (Paragraph 0041). By the applicant's admission, free fatty acids accelerates the soldering between the solder particles and the base material and accelerates coalescence of the solder particles with the solder coating formed on the base material while suppresses coalescence of the solder particles by the reaction product thereof. (Specification p.16, line 19 to p.17, line 1).

e. Regarding **8, 10**, and **12**, Saito in view of Nakajima teaches the composition of claim 1, wherein Saito teaches a liquid flux is composed of fatty acid ester (paragraph 0037), and acid numbers from 2.1 (Table 1) through 15.3 (Table 4).

f. Regarding claims **9** and **11**, Saito in view of Nakajima teaches the composition of claim 8, wherein Saito teaches a liquid flux comprised of a neopentyl polyol ester. (Paragraph 0037-0040).

METHOD

5. Claims 13 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al (WO 03/026835 A1 with specific references made through Saito et al (US 2004/0250919) in view of an English abstract of Nakajima et al (JP-05-000391).

a. Regarding claim **13**, Saito teaches a method of forming bumps comprising: deposition for depositing on a base material a solder composition including a mixture of a liquid substance with flux component (abstract) whose reaction temperature is close to the melting point of the solder particles (Table 1, where the flux reaction temperatures is 100°C and 120°C. The soldering temperature of some $SnIn_{52}$ soldering alloys is known to be 118°C and the melting temperature of some $SnBi_{58}$ soldering alloys is known to be 138°C) having such a viscosity that flows at normal temperature and that deposits in layers on a base material (paragraph 0117, where Saito teaches a solder paste which can be applied by "flowing or dipping," paragraph 0118, where the method of soldering may be "performed by an ordinary method under ordinary conditions, and Table 1, synthesis example 3 and paragraph 0122, where one embodiment expressly taught has a viscosity of 0.1 poise at 25°C); and solder particles that precipitate through

the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), and that have a mixing ratio and a particle diameter to be dispersible within the liquid substance (paragraph 0117); reflow step for heating the solder composition and forming bumps made up of solder particles on the base material (paragraph 0117); and wherein the solder particles are uniformly dispersed in the liquid substance by stirring the solder composition in a pre-stage of the deposition (paragraph 0109).

Nakajima teaches a solder paste composition, wherein the solder composition contains less than or equal to 45 wt% solder powder, which overlaps the instantly claimed 30 wt% or less solder powder, in order to obtain the required tackiness and viscosity. (English abstract).

As a result, it would have been obvious to a person of ordinary skill at the time of the invention to prepare the solder composition of Saito with 30 wt% or less solder powder, as taught by Nakajima, in order to obtain the required tackiness and viscosity. (Nakajima, English abstract).

Saito teaches mixing the flux component (paragraph 0109), therefore suggests a "particle diameter to be uniformly dispersible", as a degree of mixing and therefore obvious. See MPEP § 21144.05(II).

b. Regarding claim **15** and **16**, Saito in view of Nakajima teaches the method of claim 14, wherein Saito teaches flowing the flux component or dipping the substrate into the flux composition (paragraph 0117), and spin coating is a well known method of

flowing a chemicals across a substrate to achieve a uniform thickness of chemical over the substrate in the semiconductor and electronic arts.

c. Regarding claim **17**, Saito teaches solder flux composition (abstract) for use in electronic components (paragraph 0002) and a method of soldering using the same, wherein the liquid substance contains a flux component (abstract) and a tin alloy (paragraph 0111, where the solder powder may be of any kind, including Sn/Pb, Sn/Ag, Sn/Ag/Cu, Sn/Cu, Sn/Zn, Sn/Zn/Bi, Sn/Bi, or Sn/In, which is similar to the solder powder composition described in the Specification, p.9, line 10), solder flux composition (abstract) for use in electronic components (paragraph 0002) and a method of soldering using the same, wherein the liquid substance contains a flux component (abstract) and a tin alloy (paragraph 0111, where the solder powder may be of any kind, including Sn/Pb, Sn/Ag, Sn/Ag/Cu, Sn/Cu, Sn/Zn, Sn/Zn/Bi, Sn/Bi, or Sn/In, which is similar to the solder powder composition described in the Specification, p.9, line 10), where the flux reaction temperature is close to the melting point of the solder particle (Table 1, where the flux reaction temperatures is 100°C and 120°C. The soldering temperature of some $SnIn_{52}$ soldering alloys is known to be 118°C and the melting temperature of some $SnBi_{58}$ soldering alloys is known to be 138°C); the flux component reacts at a melting point of the solder particles (Table 1, where the flux reaction temperatures is 100 ° C to 120° C. The soldering temperature of some $SnIn_{52}$ soldering alloys is known to be 118 ° C); the mixture of the liquid substance and solder particles has a viscosity that flows at room temperature (Paragraph 0117, where Saito teaches a solder paste which can be applied by "flowing or dipping," paragraph 0118, where the method of soldering may be "performed

by an ordinary method under ordinary conditions, and Table 1, synthesis example 3 and paragraph 0122, where one embodiment expressly taught has a viscosity of 0.1 poise at 25°C); the solder particles are mixed in the liquid substance at room temperature (paragraph 0113, where mixing may be performed at any temperature, but preferably at 5 to 25°C); the mixture of liquid substances and solder particles having viscosity that flows at a normal temperature and that deposits in layers on a base material (abstract); and the solder particles are granular agents (paragraph 0018) that precipitate in the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), having a mixing ratio and a particle diameter to be dispersible within the liquid substance (paragraph 0117).

Saito teaches mixing the flux component (paragraph 0109), therefore suggests a "particle diameter to be uniformly dispersible", as a degree of mixing and therefore obvious. See MPEP § 21144.05(II).

Saito teaches the metal particles are preferable in the range of 20 to 60 microns, which overlaps with the instantly claimed particle size of 35 microns or less (paragraph 0111). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to make the composition of Saito with particles sized at 35 microns or less, since Saito teaches a particle range that overlaps the instantly claimed range (paragraph 0111).

d. Regarding claim **18**, Saito teaches a method of forming bumps comprising: deposition for depositing on a base material a solder composition including a mixture of a liquid substance with flux component (abstract) whose reaction temperature

is close to the melting point of the solder particles (Table 1, where the flux reaction temperatures is 100°C and 120°C. The soldering temperature of some $SnIn_{52}$ soldering alloys is known to be 118°C and the melting temperature of some $SnBi_{58}$ soldering alloys is known to be 138°C) having such a viscosity that flows at normal temperature and that deposits in layers on a base material (paragraph 0117, where Saito teaches a solder paste which can be applied by "flowing or dipping," paragraph 0118, where the method of soldering may be "performed by an ordinary method under ordinary conditions, and Table 1, synthesis example 3 and paragraph 0122, where one embodiment expressly taught has a viscosity of 0.1 poise at 25°C); and solder particles that precipitate through the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), and that have a mixing ratio and a particle diameter to be dispersible within the liquid substance (paragraph 0117); reflow step for heating the solder composition and forming bumps made up of solder particles on the base material (paragraph 0117); and wherein the solder particles are uniformly dispersed in the liquid substance by stirring the solder composition in a pre-stage of the deposition (paragraph 0109).

Saito teaches mixing the flux component (paragraph 0109), therefore suggests a "particle diameter to be uniformly dispersible", as a degree of mixing and therefore obvious. See MPEP § 21144.05(II).

Saito teaches the metal particles are preferable in the range of 20 to 60 microns, which overlaps with the instantly claimed particle size of 35 microns or less (paragraph 0111). As a result, it would have been obvious to a person of ordinary skill at the time of

the invention to make the composition of Saito with particles sized at 35 microns or less, since Saito teaches a particle range that overlaps the instantly claimed range (paragraph 0111).

Response to Arguments

6. Applicant's arguments with respect to claims 1, 3-13 and 15-16 have been considered but are moot in view of the new ground(s) of rejection.

The applicant argues that neither Saito nor Ono teach the instantly claimed ratio of metal to dispersing medium in a solder paste.

In response, the examiner amended the Office action as *supra*.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YOSHITOSHI TAKEUCHI whose telephone number is (571) 270-5828. The examiner can normally be reached on Monday-Thursday 9:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art Unit 1793

/YOSHITOSHI TAKEUCHI/
Examiner, Art Unit 1793